4.1 INTRODUCTION

This chapter discusses the background information and preliminary findings of the Sustainable Industry Project's analysis of metal finishing industry. This introduction outlines the contents of this chapter. The approach to our analysis, including the scope of the project, an industry profile, and our information sources are addressed in Section 4.2. Section 4.3 presents our findings to date, including:

(1) Information on the economic characteristics of the industry;

(2) Descriptions of key factors that influence environmental performance in this industry (drivers and barriers); and

(3) A list of policy options that might enhance the drivers and reduce the barriers to improved, more cost-effective environmental performance by the metal finishing industry.

4.2 APPROACH TO ANALYSIS

4.2.1 Scope

The Electroplating, Plating, Polishing, Anodizing, and Coloring industry[1] is classified under Standard Industrial Code (SIC) 3471 and includes establishments primarily engaged in all types of electroplating, plating, anodizing, coloring, and finishing of metals and formed products for the trade. This industry also includes establishments that perform these types of activities on purchased metals or formed products. Establishments that both manufacture and finish products are classified according to their products, but nonetheless are considered a part of the metal finishing industry.[2]

Hereinafter referred to as the metal finishing industry.

Although much of the industry data collected for this study applies to establishments classified under SIC 3471, establishments classified under SIC codes other than 3471 that have metal finishing

4.2.2 Overview of Industry

In general, establishments engaged primarily in metal finishing tend to be small, independently owned "job shops." In this report, we often refer to these establishments as independent metal finishers. Establishments that conduct metal finishing operations as part of a larger manufacturing operation are referred to as "captive" metal finishers. While most of the data analyzed in this report have been collected from independent metal finishers, we believe the analysis is applicable to the captive metal finishers as well. Enough similarities exist between the independent and captive facilities that they can essentially be considered part of one industry. In addition, the two segments have parallel ties with suppliers and customers. Differences that do exist between the two segments can be used to understand more fully the drivers of the decision-making processes and the barriers to improved environmental performance in each segment.

The independent and captive metal finishers use the same types of processes and fall within the same regulatory framework. Captive operations may be more specialized, or focused, in their operations because they often work only on a limited number of products and/or employ a limited number of processes. Independent metal finishers, on the other hand, tend to be less focused in their operations because they may have many customers, often with different requirements. In general, captive metal finishers tend to have greater access to financial and organizational resources and, as a result, tend to be more proactive in their approach to environmental management; however, this isn't always the case. Independent and captive metal finishers do not ordinarily compete against each other since captive finishers seldom look for outside contract work. However, captive facilities may use independent facilities as subcontractors to perform tasks that their own captive operations are unable or choose not to do. In addition, some captive facilities have been recently shut down in cases where management has decided that metal finishing is not of strategic importance to the firm's long-term success. In these cases, the firm's plating activities are shifted to independent shops.

The metal finishing industry has developed close relationships over the years with both its upstream material and equipment suppliers and its downstream customer base. Metal finishers have come to rely upon their suppliers to help them understand new developments in plating technology and upon their customers to define product requirements. Excellent plating quality and responsive service are the two defining competitive variables within the metal finishing industry.

4.2.3 Information Gathering and Panel Meetings

Our goal in this study was to characterize the metal finishing industry to understand the products and processes used in the industry; supplier/industry/customer relations; industry and firm-level structure and organization; financial and economic histories and trends; and the drivers toward and barriers against environmental improvement that affect the industry now and/or are likely to affect the industry in the future. As discussed in Chapter 2, we define drivers and barriers as those leverage points that directly affect corporate decisions in areas such as environmental compliance and improvement. In order to obtain this information, we collected and reviewed numerous documents and data sources which describe the metal finishing industry. In addition, we contacted numerous agencies, organizations and individuals who had knowledge of the metal finishing industry. A list of the information sources used in this analysis can be found in Exhibit 4.2-1.

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operations are also considered in this analysis.

Exhibit 4.2-1

CONTACTS AND SOURCES FOR THE METAL FINISHING INDUSTRY (to date)

Documents	Industry Associations	Industry Members	Government	Non-Governmental Organizations
The U.S. Census of Manufacturers The U.S. Industrial Outlook The Toxics Release Inventory (TRI) The Code of Federal Regulations Numerous industry-specific reports, studies, and articles	American Electroplaters and Surface Finishers Society (AESF) National Association of Metal Finishers (NAMF) Metal Finishers Suppliers Association (MFSA) American Institute for Pollution Prevention (AIPP) Lawrence Livermore National Laboratory (LLNL)	Pratt & Whitney (United Technologies Corporation) Whyco Chromium Company, Incorporated Light Metals Coloring Company, Incorporated Mid-Atlantic Finishing, Incorporated Simmonds Precision Aircraft System (BF Goodrich Aerospace) Connecticut Resource Group, Inc. Haward Corporation Universal Fasteners, Inc. Frederick Gumm Chemical Company Enthone-OMI Corporation Integrated Technologies, Inc. Pollution Prevention International	U.S. EPA: - Office of Solid Waste - Office of Water - Office of Air - Office of Research and Development - Office of Enforcement and Compliance Assurance - Risk Reduction Engineering Laboratory (RREL)	Environmental Defense Fund Association of Metropolitan Sewage Agencies Hopewell Regional Wastewater Facility

Following this initial data collection, we compiled a preliminary list of what we felt were some of the key industry characteristics and trends, as well as lists of the drivers of decision-making; barriers to improved environmental performance; and possible incentives to improved environmental performance. These preliminary findings provided the framework for discussion at an industry expert panel meeting held on January 14, 1994, that consisted only of industry members and experts. At this meeting panel participants assisted us in clarifying the major issues, drivers, and barriers, and in identifying potential policy options that EPA could consider to remove some of these barriers. The organizations that were represented at this expert panel meeting are listed in Exhibit 4.2-2. For a complete list of the individuals who attended this meeting see Appendix 4-C.

Based on the discussion at the panel meeting, we made changes to the initial list of drivers, barriers, and possible policy options that we had identified.

On March 11, 1994, we convened a second panel meeting for the purpose of involving other stakeholders to the metal finishing industry who are not industry or trade association members. The goal of this second meeting was to reaffirm our characterization of the industry and to identify and prioritize some of the more acceptable and feasible policy options that EPA could consider for this industry. The participants in the second panel meeting included regulators, publicly owned treatment works (POTW) representatives, environmental organizations, as well as industry members and trade association representatives. The participating organizations and agencies also are listed in Exhibit 4.2-2. A discussion of the findings of the second panel meeting is included in Section 4.3.3 below.

Exhibit 4.2-2

PANEL MEETING PARTICIPANTS

Panel Meeting #1 - January 14, 1994	Panel meeting #2 - March 11, 1994
American Electroplaters and Surface Finishers Society (AESF)	American Electroplaters and Surface Finishers Society (AESF)
Connecticut Resource Group, Inc.	Association of Municipal Sewage Agencies (AMSA)
Enthone-OMI Corporation	Connecticut Resource Group, Inc.
Frederick Gumm Chemical Company	Environmental Defense Fund
Haward Corporation	EPA, Definition of Solid Waste Task Force, Office of Solid Waste
Integrated Technologies, Inc.	EPA, Engineering and Analysis Division, Office of Water
Metal Finishers Suppliers Association (MFSA)	EPA, Office of Compliance, Office of Enforcement and Compliance Assurance
Mid-Atlantic Finishing, Inc.	EPA, Risk Reduction Engineering Laboratory, Office of Research and Development
National Association of Metal Finishers (NAMF)	Frederick Gumm Chemical Company
Simmonds Precision Aircraft Systems (BF Goodrich Aerospace)	Haward Corporation
Universal Fasteners, Inc.	Hopewell Regional Wastewater Facility
	Integrated Technologies, Inc.
	Metal Finishers Suppliers Association (MFSA)
	Mid-Atlantic Finishing, Inc.
	National Association of Metal Finishers (NAMF)
	Pollution Prevention International
	Simmonds Precision Aircraft Systems (BF Goodrich Aerospace)

4.3 MAJOR FINDINGS

4.3.1 Industry Characteristics

Definition of Metal Finishing

Electroplating, plating, polishing, anodizing, and coloring are industrial processes that either coat or finish metal or other formed products. Finishing, or more broadly speaking surface finishing, is the process of coating a metallic or plastic object with one or more layers of another metal, paint, or plastic to enhance, alter, or finish its surface.[3] Firms that apply these coating processes to a metallic base material can be grouped together in what is referred to as the metal finishing industry. Surface finishing/metal finishing provides protection for the base material and/or changes the surface of the base material to create any one or some of the following desirable characteristics:

- Improved appearance
- Corrosion resistance
- Abrasion resistance
- Wear resistance
- Improved lubricity
- Improved decorative appearance
- Improved solderability
- Light reflectivity
- Improved electrical properties (e.g., insulation, conductivity)
- Temperature resistance
- Non-toxicity

Markets

The metal finishing industry is a highly diverse and flexible industry catering to many applications. Products that have undergone surface finishing can be found almost anywhere. Some examples of the major industries that depend upon metal finishing in the manufacturing of their products are:

- Automotive
- Aerospace
- Commercial Aviation
- Communication
- Computer Equipment
- Construction Hardware
- Defense
- Electric Hardware
- Furniture
- Household Appliances and Accessories
- Jewelry
- Motorcycles/Bicycles
- Oil Drilling Equipment
- Steel Mill Products
- Tools and Dyes

This definition is taken from the brochure "Understanding Surface Finishing," published by the National Association of Metal Finishers (NAMF), Chicago, Illinois.

Processes

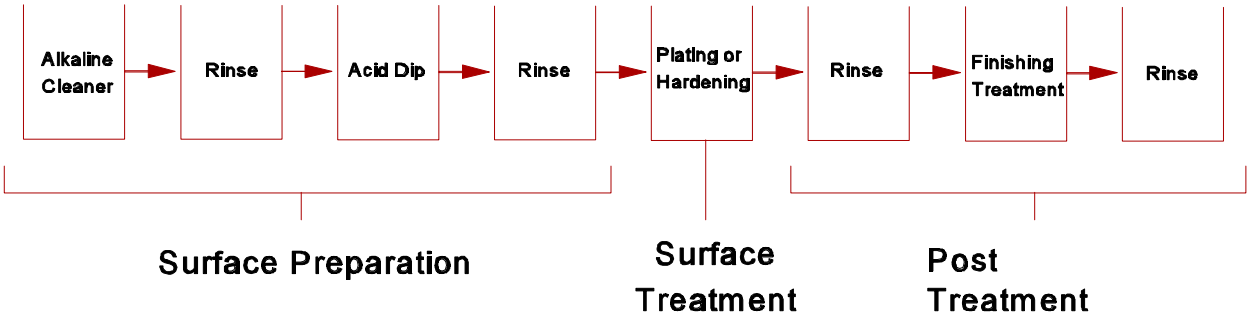
In general, objects to be finished (workpieces) undergo three stages of processing, each of which involves moving through a series of baths containing reagents designed to complete a certain step in the process.[4] These three stages are listed below, and Exhibit 4.3-1 illustrates each of the three basic stages and the steps typically associated with them.

1. Surface Preparation. The surface of the workpiece is cleaned in preparation for treatment; detergents, solvents, caustics, and other media are commonly used in this stage, and the workpiece is then rinsed.

2. Surface Treatment. This stage involves the actual modification of the workpiece surface, such as plating.

3. Post Treatment. The workpiece, having been treated, is rinsed and subject to further finishing operations, such as coloring or anti-corrosion treatment.

Exhibit 4.3-1
Overview of Metal Finishing Process



Facilities

Exhibit 4.3-2 shows the distribution and value of sales in each size category of SIC 3471 establishments for the years 1982 and 1987. As noted earlier, there are two main types of metal finishing establishments, independent metal finishers and captive metal finishers. Approximately 3,500 independent metal finishing establishments operate in the United States. These establishments receive their workpieces from outside their company. A typical job shop is a small single establishment that employs 15 to 20 people and generates $800 thousand to $1 million in annual gross revenues.[5]

Note that these steps will vary according to the specific process type (e.g., electroplating, plating, etc.)

Taken from the brochure "Understanding Surface Finishing," published by the National Association of Metal Finishers (NAMF), Chicago, Illinois.

Greater than two-thirds of independent metal finishers employ less than twenty employees, and less than one-half of one percent of the establishment have 250 or more employees. Between 1982 and 1987 the total number of independent metal finishers employing less than 20 employees declined slightly, while those employing 20 employees or more increased by a corresponding amount.

Exhibit 4.3-2

ESTABLISHMENT SIZE DISTRIBUTION IN SIC 3471

	1982		1987	
Number of Employees	**Number of Establishments**	**Value of Shipments (millions of dollars)**	**Number of Establishments**	**Value of Shipments (millions of dollars)**
1-4	1,006	$ 92.2	943	$ 100.6
5-9	745	$ 206.6	706	$ 228.1
10-19	801	$ 396.0	759	$ 500.6
20-49	638	$ 815.8	719	$1,100.2
50-99	191	$ 605.6	233	$ 924.6
100-249	61	$ 481.1	80	$ 732.0
250-499	7	$ 134.0	8	$ 280.7
500-999	1	(D)	3	(D)
Totals	3,450	$2,731.3	3,451	$3,866.8

Source: Census of Manufacturers: 1982, 1987.

(D) - withheld to avoid disclosing data for individual companies; data are included in higher level totals.

Captive metal finishers are integrated into a larger manufacturing operation. These establishments, which both manufacture and finish products, are classified according to their end products and, therefore, are not listed under SIC 3471. Estimates indicate that there are approximately 10,000 captive finishing operations in the United States.

Although the metal finishing industry is geographically diverse (in 1987, 35 states employed 150 or more people in SIC 3471; total employment was 71,100 persons), the industry is heavily concentrated in what are usually considered the most heavily industrialized regions in the United States. This geographic concentration occurs in part because small metal finishing facilities often find it cost-effective to be located near their customer base.

Waste Streams

Air emissions, wastewater effluent, and solid waste are all produced during the metal finishing process. These wastes predominantly result from (1) the use of organic halogenated solvents, ketones, aromatic hydrocarbons, and acids during the surface preparation stage; and (2) the use of metals (primarily present in the form of dissolved salts in the plating baths) in the surface treatment stage of the process. Cyanide, used widely in copper plating baths, is also a pollutant of concern.

The top 25 chemicals in the TRI database for SIC 3471 from 1987-1990 (ranked in order of decreasing release quantities) constitute the following categories, with the TRI rankings given in parentheses.[6]

- Acids: Sulfuric acid (1)
  Hydrochloric acid (2)
  Nitric acid (7)
  Phosphoric acid (17)

- Solvents: 1,1,1-Trichloroethane (3)
  Trichlorethylene (6)
  Dichloromethane (methylene chloride) (9)
  Tetrachloroethylene (13)
  Methyl ethyl ketone (15)
  Toluene (19)
  Xylene (21)
  Acetone (25)

- Metals: Nickel compounds (8)
  Zinc compounds (11)
  Chromium compounds (12)
  Zinc (14)
  Nickel (16)
  Copper (20)
  Chromium (22)
  Copper compounds (23)

- Cyanide: Cyanide compounds (24)

- Other: Freon 113 (10)

The list contains only 22 chemicals. Sodium sulfate (5) and aluminum oxide (18) were delisted from EPCRA Section 313 in 1988 and are no longer reported to TRI; sodium hydroxide (4) was delisted in 1989.

This TRI database ranking is by total release and transfer, without regard to risk to human health. In addition to the chemicals noted above, several SIC 3471 substances listed in the TRI database have National Fire Protection Association Health ratings of 3 or 4, which indicate a high level of risk to human health.

Metal finishers are required to control, treat, and reduce their wastes. Firms in SIC 3471 had annual capital expenditures of approximately $40 million for pollution abatement for the years 1989 through 1991. This amounts to greater than 20% of the total capital expenditures for the industry. Exhibit 4.3-3 breaks down the pollution abatement costs by media.

Exhibit 4.3-3

POLLUTION ABATEMENT CAPITAL EXPENDITURES
(millions of dollars)

		Air		Water		Solid Waste	
Year	Total Expenditures	End of Line	Changes in Production Processes	End of Line	Changes in Production Processes	Hazardous	Non-Hazardous
1989	$44.9	$2.9	$1.0	$18.7	$6.3	$8.5	$7.5
1990	$34.7	$2.7	$0.7	$19.2	$5.0	$5.4	$1.7
1991	$42.1	$8.3	$3.1	$19.7	$7.9	$2.9	$0.2

Source: Census of Manufacturers: 1989, 1990, and 1991.

Regulatory Framework

Three major pieces of federal legislation regulate releases and transfers from the metal finishing industry: (1) the Clean Air Act as amended in 1990 (CAA); (2) the Clean Water Act (CWA); and (3) the Resource Conservation and Recovery Act (RCRA).

Clean Air Act

The Clean Air Act, as amended in 1990, established a list of 189 hazardous air pollutants (HAPs). Of the 56 SIC 3471 substances reported in the TRI database for 1990, 33 are included on the list of HAPs. Under the CAAA, Congress required EPA to identify major and area source categories associated with the emission of one or more listed HAPs. To date, EPA has identified 174 categories of sources. Congress also required EPA to promulgate emission standards for listed source categories within 10 years of the enactment of the CAA amendments (by November 15, 2000). These standards are known as National Emission Standards for Hazardous Air Pollutants (NESHAPS).

EPA is currently working on two NESHAPs that will directly affect the metal finishing industry. A summary of these two activities follows.

1. NESHAP: Chromium Electroplating

The chromium electroplating process emits a chromic acid mist in the form of hexavalent chromium (CR^{+6}) and smaller amounts of trivalent chromium (Cr^{+3}). Human health studies suggest that various adverse effects result from acute, intermediate, and chronic exposure to hexavalent chromium. As a result, EPA has proposed a NESHAP (58 FR 65768, 12/16/93) for chromium emissions from hard and decorative chromium electroplating and chromium anodizing tanks.

These standards propose to limit the air emissions of chromium compounds in an effort to protect public health. The proposed regulation will be a Maximum Achievable Control Technology (MACT) based performance standard that will set limits on chromium and chromium compounds emissions based upon concentrations in the waste stream (e.g., mg of chromium/m^3 of air).

EPA holds that these proposed performance standards allow a degree of flexibility since facilities may choose their own technology as long as the emissions standards (established by the MACT) are achieved. The proposed standards differ according to the sources (e.g., old sources of chromium emissions will have different standards than new ones), thereby reducing the standards' rigidity also through the recognition of diverse sources.

2. NESHAP: Organic Solvent Degreasing/Cleaning

EPA has also proposed a NESHAP (58 FR 62566, 11/29/93) for the source category of halogenated solvent degreasing/cleaning that will directly affect the metal finishing industry. This proposed standard aims at reducing halogenated solvent emissions to a MACT-equivalent level, and will apply to new and existing organic halogenated solvent cleaners (degreasers) using any of the HAPs listed in the CAAA. EPA is specifically targeting vapor degreasers that use the following HAPs: methylene chloride, perchloroethylene, trichloroethylene, 1,1,1-trichloroethane[7], carbon tetrachloride, and chloroform.

This NESHAP proposes to implement a MACT-based equipment and work practice compliance standard. This would require that a facility use a designated type of pollution prevention technology along with proper operating procedures. However, EPA has also provided an alternative compliance standard. Existing operations, which utilize performance-based standards, can continue in place if they can be shown to reach the same limit as the equipment and work practice compliance standard.

Clean Water Act

The Clean Water Act regulates the amount of chemicals/toxics released by industries via direct and indirect wastewater/effluent discharges. Regulations developed to implement this Act establish effluent guidelines and standards for different industries. These standards usually set concentration-based limits on the discharge of a given chemical by any one facility. If a facility is discharging directly into a body of water, then

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Under the Montreal Protocol, a ban on the production and importation of 1,1,1-trichloroethane will go into effect on January 1, 1996.

it must obtain a National Pollution Discharge Elimination System (NPDES) Permit. However, if a facility is discharging to a POTW, then it must adhere to the specified Pretreatment Standards. In addition, specific state or local conditions may require more stringent treatment or pre-treatment requirements than those provided by the effluent guidelines.

Currently, congress is considering a bill to reauthorize the Clean Water Act.[8] In addition to the reauthorization, the effluent guidelines and standards for Electroplaters (40 CFR Part 413) and Metal Finishers (40 CFR Part 433) are currently under review. These guidelines were promulgated in the 1970s and amended in the 1980s. EPA is scheduled to present an options paper reporting the findings of this review sometime in the Spring of 1994.

EPA is also currently developing effluent guidelines and standards for a related industry, the Metal Products and Machinery Industry (40 CFR Part 438), which are due by May 1996. Although this industry contains only cleaning and finishing operations as captive processes, it appears that EPA will integrate new regulatory options for metal finishing industry processes (SIC 3471) into this guideline.[9] Under this scenario, any effluent guidelines for Electroplaters and Metal Finishers would most likely reference appropriate sections of the guideline for the Metal Products and Machinery industry. It is unclear, however, how "job shop" operations, which are not part of the Metal Products and Machinery industry, would be covered under this scenario.

Resource Conservation and Recovery Act

Solid waste sludge is one of the waste products created during the metal finishing process. The Resource Conservation and Recovery Act classifies these wastes and requires certain methods for treatment, storage, and disposal under each of these classifications.

A material is classified under RCRA as a hazardous waste if the material meets the definition of solid waste (40 CFR 261.2), and that solid waste material exhibits one of the characteristics of a hazardous waste (40 CFR 261.20-24) or is specifically listed as a hazardous waste (40 CFR 261.31-33). A material defined as a hazardous waste is then subject to Subtitle C generator (40 CFR 262), transporter (40 CFR 263), and Treatment, Storage, and Disposal Facility (TSDF) (40 CFR 254 and 265) requirements.

Within RCRA Subtitle C, EPA has subcategorized hazardous wastes from non-specific sources in a series of "F" listings. F-listed hazardous wastes which may be relevant to the electroplating industry are identified in Exhibit 4.3-4. In November of 1992, EPA promulgated revisions to the treatment standards for spent solvents (F001-F005) and electroplating wastewater treatment sludges (F006). The new revisions concerning F006 encourage recycling the metals in the sludge by allowing chromium and/or nickel-bearing electroplating F006 sludges in high-temperature metal recovery units to meet land ban requirements.

There are two reform initiatives being proposed for RCRA which will have an effect on the metal

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One bill (S.1114) is being proposed by Senator Max Baucus (D-Montana) and Senator John Chafee (R-Rhode Island).

Taken from "Finishing Line" the newsletter of the NAMF, Vol. 15, Issue VI, p. 5.

finishing industry:

(1) The Hazardous Waste Identification Rule (HWIR)

As of April, 1992, there were two proposals for hazardous waste identification. The first proposal, CBEC, contained approaches that were health-based, technology-based, and based upon contingent management. The second proposal, ECHO, consisted of expanding the use of hazardous characteristics.

Under this proposed rule, those units that managed wastes prior to implementation will escape Subtitle C requirements only if there is no on- or off-site contamination. TSDFs would not be subject to Subtitle C if all of their units and wastes met the CBEC or ECHO levels. This will ensure significant cost savings for those individual waste streams that will no longer have to be managed as hazardous wastes.

Currently, an EPA working group is trying to develop a series of delisting standards for RCRA hazardous waste streams that can be universally applied. In other words, if certain requirements (i.e., concentration-based standards) were achieved for a given waste, then it could be removed from the RCRA hazardous waste management system.

(2) The Definition of Solid Waste

The EPA and industry representatives are currently negotiating over the definition of solid waste (specifically hazardous waste). This definition will affect how wastes are classified, which in turn determines how that waste can be handled. Industry is urging EPA to reduce regulatory requirements of solid waste if specified waste management and recycling standards are achieved.

Exhibit 4.3-4

HAZARDOUS WASTES FROM NONSPECIFIC (F LIST) SOURCES RELEVANT TO THE METAL FINISHING INDUSTRY

EPA Hazardous Waste No.	Hazardous Waste
F001	Halogenated solvents used in degreasing: tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of 10% or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
F002	Spent halogenated solvents: tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, one or more of the above halogenated solvents or those listed in F001, F004, F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
F003	Spent non-halogenated solvents: xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of 10% or more (by volume) of one of those solvents listed in F001, F002, F004, F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
F004	Spent non-halogenated solvents: cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.
F005	Spent non-halogenated solvents: toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvents mixtures.
F006	Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc, and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.
F007	Spent cyanide plating bath solutions form electroplating operations.
F008	Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.
F009	Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.
F010	Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.
F011	Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations.
F012	Quenching waste water treatment sludges from metal heat treating operations where cyanides are used in the process.

Key Industry Characteristics and Trends

During the course of our discussions with industry members, trade association representatives, and industry experts, we began to focus on a set of key industry and firm characteristics and trends that may influence a company's decision-making process with regard to environmental activities.

The balance of this section focuses on these key industry and firm characteristics and trends that influence the decision-making processes within the metal finishing industry. Understanding the role that these key characteristics and trends play in decision-making is a necessary step in the process of developing or revising current and future environmental policies.

We assume that metal finishers will act in ways that maximize profits (by reducing costs and/or increasing revenues) and will choose the least-cost methods of operation, other things being equal. Depending upon firm competencies and market demands, however, different firms within the metal finishing industry may choose different business strategies (and different environmental strategies).

For example, one firm may adopt a high quality strategy in process design or customer service that results in higher revenues and higher costs, while a competitor chooses a low-cost approach that supports price-based competition. Any market may offer room for different competitive strategies and, as we will document, the metal finishing industry has a distinct multi-layer structure that reflects not only a firm's overall business strategy, but also the environmental compliance strategy that is consistent with that business strategy.

This multi-tiered structure is perhaps the single most important industry characteristic that we should understand and research to help develop any new strategy to address environmental improvements in the metal finishing industry. This structural characteristic influences firm behavior and the way firms in the metal finishing industry define their market niche; it results from and influences the firm's commitment to environmental management; it results from and affects a firm's ability to secure financing; and it affects regulatory and enforcement policy-making strategy at the federal, state, and local level.

Although this multi-tiered structure defines the metal finishing industry as a whole, many other factors, both economic and environmental, affect the performance of each individual metal finishing operation. These factors include federal and state regulations and enforcement policies; changes in production technologies; the overall industry structure; barriers to entry and/or exit; and customer requirements. These factors affect environmental performance because they determine how much capital can be invested in environmental improvements and a firm's ability to recover this invested capital from its customers. For the metal finishing industry, the nature and capital intensity of production and environmental technologies, the size of firms, the availability of substitutes for manufacturing inputs, and the price sensitivity of demand for the industry's product are all factors that are likely to affect both environmental and economic performance.

The key metal finishing industry characteristics and trends identified during the course of our analysis are as follows:

- There are approximately 3,500 independently owned metal finishing job shops, mostly small operations with limited capital and personnel; there are also about 10,000 metal finishing operations that are captive within larger manufacturing facilities, often with greater information and other resources than job shops. Based on discussions with industry members, we have grouped metal finishing firms into four distinct tiers, based on their environmental performance, as described below:

  1. Environmentally proactive firms that are in compliance with environmental rules and regulations and are actively pursuing and investing capital in continuous improvement environmental management projects that go beyond compliance.

  2A. Firms that are consistently in compliance, but do not or cannot look for opportunities to improve environmental performance beyond that level (i.e., they do not or cannot move up to Tier 1).

  2B. Firms that would like to consistently be in compliance but are not able to do so (i.e., they want to be at least a Tier 2A firm but cannot achieve that level of performance).

  3. Older firms that want to close operations, but stay in business because they fear the legal consequences of shutting down (i.e., "good people, bad managers").

  4. Out of compliance "outlaw" firms that are not substantial competitors but pull down the reputation of the industry; the panel members agreed that regulatory and enforcement policies are designed for firms in this tier but are applied to upper-tier firms.

  The larger manufacturing units in which captive facilities are contained also can be grouped into some form of a quality-based tiered structure. It seems logical to conclude that the quality of the metal finishing operations within these manufacturing operations will tend to mirror the quality of their parent facilities.

- Chemical suppliers play a key role in the product life-cycle and influence the environmental performance of platers (especially job shops). Supply firms mirror the four tiers discussed above with respect to their own efforts at developing products that are "safer" environmentally. Upper-tier suppliers recognize the need to sell "know-how" in addition to product, realizing that upper-tier metal finishers are aggressively looking for substitute products and processes that are less toxic and create less waste.

Some upper-tier suppliers appear to be moving away from their historical sales commission incentive systems and toward a system that rewards sales of new, proprietary, and environmentally safer products. These same suppliers are also investigating profit-sharing relationships with more progressive metal finishers that want new products and/or are willing to try new products. This form of risk-sharing can provide benefits to both users and suppliers.

- Several trade associations play key roles in this industry, although membership is generally limited to Tier 1 and 2 firms. These firms take pride in their environmental record, arguing that major environmental benefits have been achieved and that lower-tier firms give the entire industry a bad name.

- Metal finishers view themselves as a service industry, responding to customer specifications and demands for quality products which, in some instances, limit their environmental options. The industry is geographically concentrated in regions that are highly industrialized. Competition tends to be focused within regions; high transportation costs and customer service requirements make it necessary, in general, for metal finishers to be located close to their customers.

- The job shop segment of the metal finishing industry seems to be relatively stable. The effect of the decline in overall U.S. manufacturing on the independent job shops appears to have been balanced by cutbacks among some of the remaining manufacturers who are eliminating their captive metal finishing operations. The service formerly provided by these captives is being subcontracted out to the independents. In addition, the decline in what were historically strong markets for the metal finishing industry (e.g., defense and aerospace), has been offset by growth in such industries as electronics and communication.

- Cleaner technologies and products already exist as the result of extensive EPA/trade association cooperation on product and process technology development and technology transfer.

- Waste streams are spread relatively evenly across three media (air, water, and solid waste). Accordingly, permitting and reporting requirements are broader and more complicated than if waste streams were concentrated in one media. Uncertainty about future regulatory actions for all three media further complicates the situation.

4.3.2 Drivers and Barriers

As discussed in Chapter 2, our goal is to understand the factors that motivate an organization's behavior with respect to investments that result in improved environmental performance. To that end, the following list contains the most significant drivers and barriers to improved environmental performance at each of the four tier levels which have been discussed during the course of our work with industry representatives and others familiar with the metal finishing industry:

1. Top firms are driven by recognition and pride in industry performance. They see the economic payoffs of strategic environmental investments and contend that flexibility in compliance would promote innovative approaches and increase their willingness to help other firms.

2. Regulatory compliance is a strong driver for firms in this large middle tier. Barriers to proactive performance include a lack of capital and information, a lack of positive reinforcement, and a "non-level" enforcement playing field. Some job shops at this level are dependent on suppliers for ingredients and process recipes that restrict their willingness and/or ability to undertake environmental improvement activities.

3. The old, outdated shops have a strong fear of liability, and have little interest in improving since they lack capital, information, and even space to do so. The firms in Tiers 1 and 2 have an incentive to help close these firms down rather than work to raise them to a higher tier.

4. The renegade shops have no incentive to improve; they do not fear enforcement because they are difficult to track down. These firms profit by undercutting top tier firms.

Some metal finishers (Tier 3 and some Tier 4 firms) may have a perverse incentive to remain operational, even in the face of disappearing profitability, due to potentially high environmental clean-up costs associated with shutting down and liquidating a business. These facilities, though operational, are not making any additional capital investments to improve environmental performance. Since they lack internal capital and cannot secure external financing to fund cleanups, these firms continue to pollute and represent a significant barrier to entry for cleaner, more efficient firms that may have higher costs in the short term.

Drivers and barriers that are more generally applicable to some or all of the tiers are as follows:

- Regulatory compliance and/or enforcement actions are the primary drivers of environmental decision-making in the metal finishing industry, particularly for the independent firms. However, many job shops lack the personnel and capital resources to look beyond baseline compliance. Liability concerns often are a barrier to obtaining loans for capital improvements.

- New, more environmentally safe product development by suppliers is driven both by the metal finishing industry (in search of lower operating costs) and the suppliers (in search of product niches and avenues to sell know-how). There continues to be, however, a lack of understanding of the metal finishing process on the part of many metal finishers and a reliance on their suppliers to provide the right recipe. Suppliers, for their part, may be reluctant to suggest environmentally proactive process or product changes because it may mean lower product sales, at least in the short term.

Any resistance on the part of customers (e.g., military purchasers) to change product quality specifications to allow for the use of environmentally safer products by metal finishers can provide a barrier to the adoption of these products. Given the right set of regulatory and/or market-based incentives (e.g., user/discharge fees on toxics use/disposal, tax incentives for investment in waste minimization, source reduction, and product substitution equipment), however, this barrier can be removed.

- Uncertainty about future regulatory activity and the effect this activity may have on plant operations inhibits long-term planning/investment and beneficial risk-taking. In addition, inconsistency in existing regulatory requirements and enforcement actions at the federal, state, and local level creates uncertainty at the very least and, at worst, competitive imbalances throughout the industry. All of this creates distrust of EPA and the states, and inhibits meaningful communication.

  For example, the proposed effluent guidelines and standards for the metal finishing industry could leave little flexibility to accommodate the differences between the two types of metal finishing operations (captive and independent). It has been indicated that the effluent guidelines and standards for electroplaters and metal finishers will be incorporated into the effluent guidelines and standards of the metal products and machinery. The unique characteristics of independent "job shop" operators could be overlooked if focus is put upon the captive operations that are part of the metal products and machinery industry.

- Some industry representatives indicated that regulations are not based on good science. Rather, they reflect a compromise among all the stakeholders, often resulting from a lack of a comprehensive understanding of the true risks involved with the use of many processes and substances. This lack of understanding may create interest in banning the use of a potentially harmful substance, and replacing it with what is thought to be a more benign substance. Substituting one type of plating process, chemical, and/or cleaning process with what are apparently better processes or chemicals may merely shift the environmental control problems from one media to another. Existing chemicals and processes, if understood and controlled, can in fact result in less environmental effects than a substitute.

- From the industry's perspective, the regulatory burdens to environmental improvement result from (1) RCRA permitting standards and hazardous waste definition (barriers to recycling and recovery); (2) Superfund de minimus standards (barrier to obtaining loans and to old shops shutting down); and (3) interpretations of CWA §§ 413 and 433 effluent guidelines.

- Military specifications continue to require the use, at least indirectly, of environmentally harmful products and processes, even though environmentally safer substitute products and processes are available. The apparent high cost of making such changes is cited as a reason that changes are implemented slowly.

- A large number of metal finishing firms face significant environmental liabilities and clean-up costs if they discontinue operations and attempt to liquidate their business. This potential liability, in addition to creating a barrier to exit for these firms, effectively eliminates any access to outside capital sources for these firms.

- Lower-tier firms are not active in trade association activities and are not aware of changes in product/process technology. They are also unaware of inexpensive, cost-effective changes that can be made to improve environmental and financial performance. Moreover, these firms often lack any incentive to change because any existing environmental liabilities may continue to overwhelm their ability to pay for remediation.

- There are significant research and development activities underway by industry (e.g., AESF), EPA, and other federal departments and agencies. These efforts to develop new metal finishing processes to achieve source reduction can serve as a driver to some firms to improve performance. However, the lack of information or capital to implement improvements can, as noted above, impose a barrier to improvements by other firms.

4.3.3 Possible Policy Options

EPA can consider a number of possible policy options to promote desired changes within the metal finishing industry. These options range from increased regulatory and enforcement activities concentrated on certain segments of the industry, to regulatory reform, to market-based approaches such as fees, taxes, and tax incentives. EPA will continue to keep two objectives in mind as it evaluates the different available options: (1) EPA must consider the characteristics, needs, and problems specific to each of the four tiers identified in the metal finishing industry and must consider the interactions between tiers; and (2) the agency will continue and expand its initial efforts to get its regional offices, the states, NGOs, and local POTW authorities involved in the process.

Second Expert Panel Meeting

Representatives at the second panel meeting on March 11, 1994 discussed and evaluated the many possible policy options that had been suggested during the course of this project and identified a few options with the greatest potential for removing the most significant barriers or providing the greatest incentive to sustained environmental improvement in the metal finishing industry. These selected options provide the focus for ongoing work in the next phase of this project. A complete list of the many policy options identified during the project is included as Appendix 4-B to this chapter.

The panel recognized the importance of the tiered structure of firms in the metal finishing industry and identified general policies that should be pursued within specific tiers. For example, some panelists noted that many regulations were written with the problems of Tier 4 firms in mind, but were applied almost exclusively to Tier 1 and 2 firms. The panel also concluded that there were a number of general issues relevant for all tiers within the industry that also should be pursued during the next phase of the project. The panel evaluated the list of options using the following selection criteria. Options should:

- Promote "cleaner" environmental performance -- have a significant environmental payoff;
- Identify "cheaper" solutions to environmental problems -- promote cost-effectiveness;
- Promote innovative and more effective ("smarter") actions by EPA, states, and the industry;
- Have the capacity to affect long-term thinking and action toward sustainability;
- Be feasible, considering the length of time required for completion, the method of implementation, the size of the relevant audience, impact and importance, and the effectiveness of EPA as a player; and
- Encourage cooperative involvement in the project among a variety of stakeholders.

The panel also noted that the metal finishing industry, largely through its trade associations, was currently working cooperatively with several offices at EPA, providing technical support on proposed policies and programs. Among these cooperative projects are the following:

- Development of the RCRA Hazardous Waste Identification Rule: Industry representatives (especially NAMF) are involved in ongoing dialogue with EPA's Office of Solid Waste to expedite delisting of F-006 waste and thereby promote greater recycling/reclamation of waste treatment residuals.
- Development of the Metal Products Effluent Guidelines (MP&M): Industry representatives (including NAMF) are providing comments on the proposed Phase 1 guidelines; industry also will participate in Phase 2 development and in CWA reconsideration of §§ 413 and 433 effluent guideline standards.
- Development of Clean Air Act MACT Standards for Chromium Electroplating and Anodizing: Industry representatives are participating in the MACT development and review process; productive dialogue to date; key comments seem to be focused on associated monitoring requirements.

The panel endorsed these efforts along with the cooperative research activities being conducted by the federal government and the industry.

A majority of the meeting was spent discussing the tiered structure of the industry and increasing our level of understanding of the types of firms that are found within each of the four tiers and the drivers and barriers that are unique to each tier. We also discussed more general drivers and barriers that are relevant to all four tiers. The panel evaluated various policy options using the selection criteria listed above, but also devoted considerable discussion to understanding the differences between firms in the four industry tiers and the existing drivers and barriers to movement up the hierarchy from lower to upper tiers. We believe therefore that part of the Phase 2 work should initially focus on defining the criteria for placement into a tier and on identifying incentives that EPA and the states could provide to encourage movement from tier to tier. This effort could then progress to a further development of specific action steps for each tier. The remainder of the Phase 2 work should focus on studies that are important to all firms in the metal finishing industry.

The following sections describe each of the tier-specific and industry-wide issues that will provide the basis for ongoing work in Phase 2 of this project. We have included some suggestions in each section to provide some initial focus in Phase 2 work. We believe that these suggestions address the priorities of all the various stakeholders in the metal finishing industry. The tiered structure is a new way to look at the metal finishing industry and the various stakeholders are still trying to understand the basic dynamics of such a structure. Phase 2 work should contribute to this understanding as well as help remove some of the barriers to environmental improvement for this industry.

Metal Finishing Industry Policy Options for Tiers 1 - 4

One panel member described the regulatory and enforcement programs for the metal finishing industry as policies that were implemented to control Tier 4 firms but have instead been used to control Tier 1 and Tier 2 firms. This, in conjunction with the need to encourage firms to move up the tiered hierarchy, constitute important conclusions and observations from the first phase of this study. Attempts to regulate the activities of the worst polluting facilities that have slipped out of the regulatory/enforcement net have instead resulted in the over-regulation of the firms in Tiers 1 and 2. This over-regulation has resulted in higher compliance costs for upper-tier firms and an increased fear of enforcement activities, coupled with a high level of uncertainty about the nature and effect of future regulatory actions. Regulators, the panelists contend, tend to place unnecessary burdens on large point sources since they cannot deal adequately with nonpoint sources of pollution.

The tier-specific discussion at the panel meeting focused on lowering the regulatory burden placed on upper-tier firms and on eliminating both the short-term and long-term problems associated with the lower tier firms. A key goal of proposed policies would be to help Tier 1 firms move to higher levels of environmental protection and encourage 2A firms to move up to tier 1, and Tier 2B to Tier 2A. The discussion was complicated, however, by a lack of explicit understanding of the criteria for inclusion in Tiers 1 or 2. As discussed later in the section on more general issues, a commitment to and implementation of Best Management Practices (BMP) for the metal finishing industry can be used as a criteria for movement from a lower to an upper tier. The following sub-sections describe the issues specific to each of the four tiers in the metal finishing industry.

Tier 1 and Tier 2

Tier 1 metal finishing firms are characterized as environmentally proactive firms that are actively

pursuing and investing capital in strategic environmental management projects. They are driven by recognition and pride in industry performance and see the economic payoffs of strategic environmental investments. Tier 2 (A and B) firms are characterized as environmentally conscious but less proactive firms that are limited in their ability or desire to actively pursue strategic environmental management practices due to lack of capital or other factors. Uncertainty about the nature and timing of future regulatory activity also contributes to the conservative strategy pursued by these firms. Regulatory compliance and fear of enforcement are the primary drivers for firms in Tier 2; barriers to improvement include lack of capital and information, and inconsistent enforcement activities that create a non-level playing field.

A major problem, however, at least for the panel members, is the lack of criteria for identifying membership in Tier 1. Most panel members believe that the Tier 1 firms are most likely small, high-tech firms. This would include captive plating operations that are relatively small, both in terms of throughput volume and value-added. The one captive metal finishing representative at the panel meeting characterized his firm as a Tier 1 facility. He had been able to implement environmental projects with a longer payback than specified in company guidelines because of the longer-term view held by management. The two independent metal finishing representatives at the meeting characterized their firms as being in Tier 2. Although both felt that their facilities were in compliance and they had invested in pollution prevention and end-of-pipe technologies, they were driven by a fear of enforcement rather than by some other sustainable philosophy.

The problem of defining Tier 1 and Tier 2 membership requirements can be resolved two ways. First, the development of industry Best Management Practices should focus on the criteria for inclusion in the top tier, as well as the criteria for continued membership. Eligibility for continued membership in Tier 1 should require a commitment to the full set of Best Management Practices and a commitment to and demonstrated success in continuous environmental improvement. The minimum requirements for Tier 2 membership should be complete regulatory compliance and a commitment to some appropriate subset of the industry Best Management Practices. Second, continued involvement by the stakeholders in an ongoing dialogue sponsored by EPA should lead to an additional understanding of the metal finishing industry with respect to the differences between Tier 1 and 2 firms and the requirements for membership in Tier 1.

What incentives are there or can be put in place to induce Tier 2 firms to move up to Tier 1? Tier 2A firms are technically in compliance and EPA can drive continued environmental improvement through regulatory actions designed to reduce the level of discharges from the metal finishing industry beyond current levels. The objective of the Sustainable Industry Project, however, is to facilitate continued voluntary environmental improvement on the part of the metal finishing industry because it makes good business sense to do so. EPA must try to remove the barriers that currently inhibit the movement from lower tiers to upper tiers, and provide incentives for firms to move up the hierarchy.

One method for removing barriers would be to lower the compliance costs for Tier 1 firms from what is estimated to be 7 to 10 percent of total costs to 2 to 5 percent of costs. Tier 1 firms would also need to make a commitment to provide a certain amount of technical assistance to lower- tier firms. Obviously, penalties for Tier 1 firms that are found to have not met their commitments should be severe.

EPA can lower the compliance costs for Tier 1 firms in a number of ways, including: using electronic reporting; requiring less frequent sampling of waste streams; eliminating some reporting requirements; implementing longer permit periods with fewer inspections; and implementing an even-handed enforcement policy that focuses on the environmental renegades and places more importance on discharge violations rather than paperwork violations. In effect, EPA will be trading a greater level of trust for continued environmental excellence. The states and the POTWs will be very important stakeholders in this program and should be involved in every step of its development process.

EPA can create additional incentives to attain Tier 1 status by linking Tier 1 status with membership in some form of an environmental leadership program. EPA should examine the applicability of ideas used in OSHA STAR and other "incentive" programs to this effort. This leadership program could attempt to reward environmentally progressive firms by helping the best firms gain access to financial resources; either through outside lending institutions or through financial assistance made available by EPA in the form of loans and/or grants. It may also be possible to link membership in this environmental leadership program with access to U.S. government agency metal finishing contract work (e.g., DOD). One additional incentive that EPA could consider is access by Tier 1 firms to an expedited delisting process for any RCRA listed waste streams that are eligible for delisting.

It will be important to determine whether the investments required to upgrade to Tier 1 status are disproportionate to the rewards associated with Tier 1 status. To help avoid this, EPA could consider assisting Tier 2 firms with their capital requirements through access to zero or low-interest loans or grants. Qualification for these funds would require passing an environmental audit, making a commitment to follow the set of industry Best Management Practices required for Tier 1 status, and developing a business plan that would commit the money to specific projects focused on doing what is necessary to attain Tier 1 status. EPA can improve the willingness of Tier 2 firms to invest their own capital in environmental improvements by reducing the uncertainty associated with future regulatory requirements. One way to accomplish this is to create a credit system for improvements made independent of regulatory requirements; this would eliminate the fear that technology improvements may be rendered obsolete by future regulatory requirements.

The second panel concluded that economic benefits would accrue to Tier 1 and Tier 2 firms as well from the implementation of policies and programs specific to Tier 3 and Tier 4 firms. The development of any tier-specific overall policy strategy should take into consideration the importance of linking tier-specific policies within a coherent framework to maximize benefit transfer from tier to tier. The following subsections discuss the possible policy options for Tier 3 and Tier 4 firms that the panel felt would, on balance, strengthen the metal finishing industry.

Tier 3

Tier 3 metal finishing firms are characterized as companies that are not environmentally proactive firms and which face severe financial limitations. These firms may want to go out of business but won't because of liability concerns from wastes generated by past (and in some cases, current) operations. These old, outdated shops have a strong fear of liability; they cannot improve their environmental performance due to a lack of capital, information, and frequently, space. There was a strong consensus among the second panel industry members that a significant number of firms in Tier 3 exist.

The panel essentially concluded that while exit for these firms may be viewed as a short-term negative because of the loss of jobs and the costs associated with site cleanups, in fact the loss of these Tier 3 firms is a long-term positive because the jobs should be transferred to Tier 1 and Tier 2 firms that capture the business and because site remediation that is started now will prevent worse, more costly problems in the future (i.e., a pollution prevention benefit). In addition, the firms higher in the hierarchy operate in a more environmental sensitive manner, producing less pollution.

What is the best way to facilitate exit for those Tier 3 firms? The fear of disclosure and subsequent reprisal must be eliminated so that Tier 3 firms will come forward. It should not be difficult to find these firms; most are visited regularly by enforcement officials keeping tabs on their operations. The danger from EPA's and the states' perspective in following such a strategy is that the number of firms that come forward may far outweigh the agency's ability to either commit funds to initiate facility closure and cleanup or to provide

investment capital to make process improvements. A necessary first step is to compile information on the population of metal finishers within the particular geographic area under consideration to provide a first cut assessment of the scope of the problem. Enforcement offices, trade associations, POTWs, and NPDES permit monitoring offices should be able to provide a wealth of information.

For those Tier 3 firms that choose an exit strategy under this proposed amnesty program, EPA and the states need to commit the necessary resources to conduct a site evaluation to determine the nature and extent of any environmental problems, to evaluate the risks associated with those problems in order to prioritize remediation alternatives, and to determine the level of cleanup required commensurate with future use alternatives for the site. One possible approach might include, in exchange for some degree of amnesty granted under this program, a commitment from a facility to take an active leadership role in shutting down the facility and in completing any remediation work at the site before it could be sold. However, this amnesty must not completely remove a firm from liability nor remove its responsibility for cleanup. In addition, deed restrictions on the use of the site appropriate for the level of remediation completed should be put in place for the facility prior to sale and/or alternative use.

There are a number of unresolved issues with such a program. First, the regulatory agencies must be willing to commit financial resources to facilitate any site remediation work that is required. Second, these same agencies must attempt to answer the question of "how clean is clean" for each site based on the projected future use of the site. Finally, the owner of the facility must be actively involved in site remediation that may include on-site treatment. The owner has a detailed understanding of the processes used at his/her facility; this individual should be able to make a valuable contribution to site cleanup.

Tier 4

Tier 4 metal finishing firms have been characterized as not environmentally proactive firms that are likely not in compliance with environmental regulations. These firms price their services below Tier 1 and Tier 2 firms, creating a competitive disincentive for more proactive firms to continue to invest in proactive environmental strategies. These renegade shops are difficult to find -- they are probably operating without permits and do not report discharges. They have no incentive to improve and do not fear enforcement because they are difficult to track down. They profit by having a lower cost structure which undercuts upper-tier firms.

The second panel concluded that the major issue with Tier 4 firms is not that they represent a significant competitive force within the metal finishing industry, but that they give the overall industry a bad name and create additional pressure on upper-tier firms with respect to enforcement actions and regulatory/reporting requirements. There is an over-regulation of upper tier firms to compensate for the inability of regulatory agencies to alleviate the problems caused by Tier 4 firms and because of a possible misunderstanding of the industry as a whole. There was a recognition by the panel members that the extent of the environmental problems associated with the Tier 4 firms is largely unknown. They felt, however, that this should not be a deterrent to an increased focus on this sector of the industry.

The panel concluded that finding and eliminating Tier 4 firms should be a priority. To help accomplish this, it may be necessary to redirect agency and state resources currently focused on monitoring and enforcement of upper-tier firms to identifying Tier 4 firms. Some suggested that enforcement policies could be directed away from targeting upper-tier firms. Finally, POTWs should be granted increased flexibility, the panel noted, in inspection, sampling, and enforcement requirements. Presently, POTWs must inspect and sample every facility at least once per year and are required to enforce paperwork violations with the same vigor as discharge violations. POTWs can improve their monitoring capabilities and identify more Tier 4 firms if they have the flexibility to use their monitoring equipment to find these firms rather than sampling the effluent of the known Tier 1 and Tier 2 firms.

A significant unresolved issue concerns the environmental liabilities and cleanup costs associated with shutting down Tier 4 firms. The feasibility of designing programs for Tier 4 firms that are similar to those proposed for Tier 3 firms was not pursued by the panel and should be a topic for further consideration.

General Metal Finishing Industry Policy Options

The second panel also discussed three possible non-tier-specific policy options that were felt to be important with respect to drivers and barriers in the metal finishing industry. The issues addressed by these policy options are (1) the need to develop Best Management Practices for metal finishing facilities; (2) the inconsistencies in standard setting, permit review, administration, and enforcement activities at the state level; and (3) the extent to which suppliers and customers are the primary drivers of toxics use in the metal finishing industry.

Development of Best Management Practices for The Metal Finishing Industry

The second panel endorsed the idea of an industry-managed effort to develop and implement Best Management Practices for the metal finishing industry. This BMP would be used to develop pollution prevention strategies for the industry and could also be used to provide a roadmap for Tier 2 firms to move up, within the second tier and to Tier 1 status. The panel felt that EPA's role should be limited to providing financial and administrative assistance to the effort, believing that while it was appropriate for the government to regulate discharges and emissions, it was not necessary or appropriate for government to dictate specific pollution prevention strategies.

In addition to providing a roadmap for lower tier firms to use to progress to the upper tiers, the BMP would also be designed to ensure compliance for any firm that has implemented the BMP at their facility. A commitment to follow the complete set or a subset of the BMP would be required for membership in Tier 1 or Tier 2 respectively. In these respects, a BMP would differ from Good Operating Practices because the latter does not necessarily guarantee success, only that accepted practices are being followed. The BMP would also be designed to drive continuous improvement/waste minimization strategies that Tier 1 firms would be required to commit to as a requisite for continued membership in Tier 1.

The panel also concluded that the BMP, as envisioned, could be used to help the metal finishing industry gain increased access to outside capital for investment in environmental technologies and process changes required for a company to move to a higher tier. The BMP could be used not only to educate lending institutions about the effectiveness of a given technology, but also to alleviate any fear on the part of lenders that a particular technology would have no market value. If it is clear that hundreds, if not thousands, of metal finishing facilities use this technology, then there is a ready market for resale if necessary. Educating lending

institutions in this way should be linked to any ongoing efforts to weed out the bad firms in the industry and to reduce the fear factor that inhibits Tier 2 firms from applying for loans.

Eliminating Regulatory and Enforcement Inconsistencies at the State Level

Existing inconsistencies in standard setting, permit review, administration, and enforcement activities at the state level result in higher compliance costs and unnecessary uncertainty about the regulatory process for metal finishing firms. The second panel discussed some of these issues in detail and proposed a number of possible solutions to these problems. Perhaps the most important issue discussed by the panel in this area concerned the non-uniformity of discharge standards at the state and local levels.

In theory, it would be a relatively straightforward task to set uniform national discharge standards and require states (and localities) to justify more stringent standards on a scientific basis. In practice, this task seems difficult if not impossible. States and localities set standards based upon site specific conditions that depend on the number and type of other dischargers and the physical, chemical, and biological characteristics of the environment to which the pollutant is being discharged. The relative contribution to the pollutant loading by non-point sources is an important variable in this equation. If the discharge is to a POTW, the way in which the POTW disposes of their sludge is an important variable the control authority considers in setting standards. The chances that EPA could impinge upon the state's authority in this process are extremely low.

One way in which EPA can help to ensure that the process is scientifically based is through its audit of state programs. EPA must ensure that the states are reviewing technology-based POTW local limits, as well as making a concerted effort to set NPDES discharge levels, in a fair and equitable fashion. One way in which metal finishers may be granted some consideration for having to meet regulations, more stringent than federal standards, would be to recognize their contribution to reducing the pollutant in complying with the more stringent standards. This compensation could take the form of adjustable water/sewer rates, for example, for discharges to POTWs.

Other issues discussed by the panel included the difficulty associated with obtaining permits and complying with reporting requirements for multi-media discharges from state agencies that are historically organized by media; the disincentive that arises from the requirement that permits must be modified or reissued when process changes are implemented; the lack of enforcement policies that are designed so that penalties reflect the seriousness of the infraction; and the lack of consistent cross-media technical assistance and facility inspection programs. The panel felt that the simplest and most effective solution to these problems is for the states and EPA to develop a multi-media industry-focused perspective, where multi-media service teams trained to provide permit, reporting, and technical assistance to a limited number of industries could assist individual firms with any problems.

In effect, these service teams would become a one-stop shopping resource for all firms within a particular industry. At the very least, these teams would help to ensure consistency throughout a particular industry within a given state, would facilitate technology transfer, and would minimize issues that arise when misapplied pollution prevention programs do not reduce emissions but merely transfer them from one media to another.

Analysis of Customers and Suppliers as Drivers of Toxics Use in the Metal Finishing Industry

The second panel agreed that life-cycle issues related to the use of toxic substances in the metal finishing industry were important with respect to any discussion of drivers and barriers to environmental improvement for this industry. In addition, an assessment of pollution prevention and waste minimization opportunities in the metal finishing industry necessarily requires an analysis of the effects of eliminating the use of toxic substances, either by banning their use outright or by instituting taxes or user fees that would result in a drop in usage.

There are several potentially important issues related to eliminating the use of a particular toxic substance, including the availability and suitability of substitute products; the overall life-cycle, multi-media environmental effects of the substitute compared to the original substance; the effect on the quality of the customer's product; the acceptance of any change by the ultimate consumer of the customer's product; and the ability and motivation of the suppliers to the metal finishing industry to develop and market a substitute product and process. On the other hand, suppliers also need to be concerned about Superfund de minimis liabilities that may arise from the continued use of toxic materials.

The panel agreed that the best way to begin to evaluate the issues related to product substitution might be to initiate a pilot project that brings the suppliers, metal finishers, and customers together to assess life-cycle issues related to the continued use of a toxic substance. The panel thought that cadmium might constitute a good candidate for this study since the U.S. Department of Defense was a significant user of cadmium-plated products and the agency moves slowly in approving any changes in product specifications. Another potential pilot project might focus more on a consumer product where it would be useful to analyze the public's reaction to changes in appearance (and perhaps performance) of plated products.

The panel wondered whether EPA was currently funding life-cycle analysis studies and, if so, whether these funds could be redirected. Currently EPA's Design for the Environment program and the President's Council on Sustainable Development are considering life-cycle issues as part of their efforts.

Appendix 4-A

BIBLIOGRAPHY OF THE METAL FINISHING INDUSTRY

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Appendix 4-B

ALL SUGGESTED POLICY OPTIONS

Appendix 4-B

ALL SUGGESTED POLICY OPTIONS

The following is a broader list of all the policy options that were discussed throughout the course of this project.

- Consider policies and programs that meet the unique needs of the four tiers of metal finishing firms. Specifically:

  (a) Allow for more flexibility in compliance for Tier 1 companies in exchange for measurable commitments to work toward zero discharge, and to establish and adhere to Best Management Practices for the industry;

  (b) Reduce the uncertainty about future regulations for Tier 2 companies by creating a credit system for improvements made independently of regulatory requirements, and assist these firms in obtaining outside capital through grant and/or loan programs (qualification for these funds would require an environmental audit and a commitment to follow Best Management practices);

  (c) Provide the assistance necessary for tier 3 firms to go out of business without fear of litigation and bankruptcy due to environmental liabilities; and

  (d) Target enforcement activities and more rigid requirements at Tier 4 firms.

The following policies and programs should be considered for all metal finishing industry members.

- Set uniform national standards, and require states and localities to justify more stringent standards, to avoid "cleaner-than-thou" competition that leads to unachievable and unnecessary limits; and require POTWs to target all sources of contaminants, rather than concentrating only on industrial sources that have already been reduced. It is important to recognize, however, that states and localities develop standards based upon the unique set of circumstances that are found within the jurisdiction of a particular POTW. The creation of a level playing field for the industry must take this into consideration. Total costs should be the criteria, not just compliance costs.

- Promote toxics regulations based on sound scientific risk-based approaches; send clear signals to all the stakeholders about relative risks; and avoid bias against existing chemicals while ignoring the potential risks of unknown substitutes. EPA can play a role in educating the general public about the environmental impact of electroplating that will help to eliminate the fear factor that influences the regulatory process. Above all, strive to make the regulations simple to reduce the compliance burden on small companies.

- Expedite the permitting process and create consistency among the states in the permit review process.

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(continued)

ALL SUGGESTED POLICY OPTIONS

- Facilitate the cooperative development of BMP for electroplaters, and trade flexibility in compliance for commitment to these practices for companies with good environmental records.

- Develop an enforcement strategy that is fair and reasonable. Rate companies based upon their performance relative to some defined baseline or benchmark and treat them accordingly. Target initial efforts at Tier 4 firms whose lack of compliance creates a competitive imbalance throughout the industry.

- Recognize positive environmental performance as a good first step toward the creation of a spirit of cooperation and open communication between EPA and the electroplating industry. Any recognition program, however, must be structured in such a way as to accrue the right kinds of benefits to environmentally proactive firms (e.g., improved credit rating and access to capital, and higher sales). EPA must also develop such a program within the context of changing perceptions of the industry.

- Support technology transfer initiatives and environmental audit programs.

- Support tax incentives for investment in waste minimization and source reduction equipment, and support the capitalization of clean-up costs.

- Support use/discharge fees to promote pollution prevention in the electroplating industry (in lieu of environmental audits).

- Strongly encourage changes in the mil specs to require the use, where possible, of environmentally safer products and processes in the electroplating industry.

- Modify RCRA to provide incentives for greater reclamation/recycling of waste treatment residuals and facilitate a move toward zero discharge facilities.

- Investigate further uses of information-based options, such as reporting and public disclosure requirements. Currently, the Toxic Release Inventory is a good example. Using this inventory effectively, specific waste stream trends can be highlighted in a media-specific and/or facility-specific format. Publicly disclosing facilities with poor release practices and trends could serve to motivate facilities to improve environmental performance. Enhanced reporting requirement in the TRI beginning in 1991 (e.g., recycling and energy recovery) could potentially make this option even more useful. Another example would be if hazardous waste generators were required to disclose their waste minimization plan to the public. Fear of bad publicity could propel many of the individual generators to improve their waste minimization practice. The EPA is currently considering this requirement.

Appendix 4-C

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